

Education, communication *and culture in the information* society: a Latin American *perspective*

Martín Hopenhayn

*Social Affairs Officer,
Social Development Division,
ECLAC
mhopenhayn@eclac.cl*

The swift changes being wrought by the information society in the spheres of production and communication have inevitably meant rapid, large-scale alterations in the way knowledge is transmitted, communication carried out at a distance and information used in the new media. Progress in education has to be driven forward in combination with another pillar of the information society, namely access to communication via interactive media, where what is at stake is not only competitiveness but also cultural identity and, increasingly, civic participation. This is why the interaction among education, culture and new information and communication technologies is so vitally important. Educating people with new information and knowledge technologies means teaching them to impart meanings to these that reconcile the new ways of producing and working with the new ways of exercising rights, affirming cultures, acquiring knowledge, communicating at a distance and participating in networks.

I

Education on the pedestal and in the dock

Education has long been regarded as the prime link in the chain of cultural integration, social mobility and productive development. A society with high levels of schooling and good educational attainments tends to be more egalitarian in its income structure (owing to the occupational returns on education), to have greater cultural cohesion and more diversified culture markets, and to grow economically by means of leaps in productivity rather than through overexploitation of human or natural resources. Both in the development literature and in the political debate, the importance of education as this “prime link” is now widely recognized.¹ Hard upon the question of what type of development we want comes the question of what type of education we have.

As the consensus of the day has it, the centrality of education for social and occupational mobility and productive development is becoming even more decisive today, given the growing importance of innovation and knowledge in the economic process. The argument is that education enables people to participate in the information technology revolution, get “intelligent” jobs and join in the networks where knowledge circulates. A lack of education, on the other hand, leaves them stranded in cybernetic illiteracy and low-productivity, low-wage jobs and deprived of long-distance dialogue and much cultural interaction. The prospect of well-being offered by education today means not only the future opportunity to generate higher incomes than our parents had, because of our greater human capital, but also the opportunity to use the skills acquired to exercise new forms of citizenship, participate constructively in multiculturalism, combine immediate experience with media-transmitted experience, in short, update one’s own life history with the emancipating ideas of modernity.

Meanwhile, in a more instrumental dimension, openness to the world is making national societies more and more dependent on external competitiveness, and this in turn depends on intelligence and fresh knowledge

being incorporated into the production system. As a result, development options require large, swift educational leaps. It is not just a matter of having a population with more years of formal education. It is necessary to learn more, but above all to learn differently. It is necessary to acquire the skills that are now needed to join creatively in the new forms of work and to participate with a “dialogical” rationality in negotiating and decision-making. ECLAC and UNESCO warned a decade ago that “since knowledge will be the central element of the new paradigm of production, educational change will become a fundamental factor for developing the qualities of innovation and creativity, together with integration and solidarity, which are key aspects both for the exercise of modern citizenship and for attaining a high level of competitiveness” (ECLAC/UNESCO, 1992, p. 113).²

This requires assets that people will have to acquire from different knowledge creation and transmission sources. The supply will have to consist of variable combinations between formal education and the culture industry to develop aptitudes that are useful in the information society and the media society: the ability to express demands and opinions in communications media and exploit the growing flexibility of these, personal initiative, a willingness to change and the ability to adapt to new challenges, the management of multiple rationalities, a critical spirit in selecting and processing messages, the ability to translate information into learning, and so on.

² In the same spirit, the document adds: “The transmission of values, the ethical dimension and the forms of behaviour typical of modern citizenship, together with the generation of the capacities and skills which are essential for international competitiveness (which is increasingly based on technical progress), receive a decisive boost from education and the production of knowledge in a society. Reform of the system of production and dissemination of knowledge is consequently a crucial instrument for tackling both the internal challenge, which is that of building citizenship, and the external challenge, which is that of competitiveness. It will therefore be understood why this dimension has a central place in the ECLAC proposal on changing production patterns with equity” (p. 17).

¹ See ECLAC/UNESCO (1992); Hopenhayn and Ottone (2000).

The acquisition of these new skills does not begin with a blank slate. It is not just a matter of acquiring knowledge: there needs to be an interactive learning process, where the emphasis is placed far more on the production of new cognitive syntheses in the student than on the acquisition of ready-made knowledge. All this implies positive engagement, interaction and a critical spirit. The very redefinition of learning involved in the transmission of these skills entails a paradigm shift in the style of education: from memorizing to understanding, from absorbing information to discriminating between messages, from the encyclopaedic acquisition of knowledge to a selective approach, from mechanical discipline to responsible autonomy, from learning to learning to learn.

From a cultural perspective, the status of education is more ambiguous. On the one hand it is regarded as having performed an undesirable historical role, being subordinated to cultural homogenization projects driven by the model of a nation-State that always sought to align territorial unity with symbolic unity. Thus, more recent defenders of cultural pluralism and identity diversity have put forward a critical reinterpretation of the traditional role of education. The charge is that education was treated in part as an Enlightenment crusade whose objective was the acculturation of ethnic minorities and the imposition of a common rationality to consolidate political and territorial unity by drilling people more thoroughly in the codes of modernity and loyalty to nationalist values. Another criticism is that education, or more traditional versions of it, did not so much stimulate the potential of those being educated as stifle their creativity and repress their truest feelings.

But the cultural role of education has also been reinterpreted positively, as the basis from which reality can be critically reappraised and new collective projects devised, and from which we can learn to live in a multicultural world. Learning about difference or plurality should not be understood as just one more subject for study (like geography, history or anthropology). It is about reformulating the linkage or intersection between a top-down curriculum and the cultural identities that come from below, or between the subjects learnt and those learning them, just as it is about anchoring global content in local realities and, conversely, reformulating content from the worlds of life that students bring into the classroom with them. This linkage will not be forged in the upper reaches of educational planning but in the more particular context of each school. More than curricular content, what is required is the creation in people of a general

willingness to change the ways they learn, communicate and produce. "The future of work," warns Alain Touraine, "is so unforeseeable, and will be so far removed from what most of those now at school have learnt, that the first thing we need to ask schools to teach them is preparedness for change rather than specific skills that will probably be obsolete or useless for most of them before too long" (Touraine, 1997, p. 328).

To think of difference is to think of learners as "traversing" difference and of the other as a questioning of the self. This holds true for the encounter between different cultural identities, but also for the relationship between teachers and students, and between male and female students. Learning about difference thus comes to mean learning about citizenship: learning to put oneself in the other's place and to see things through the other's eyes. As Magdaly Téllez puts it, "unless this relationship (alterity) is involved, the recognition of difference means no more than the acknowledgement of plurality, and what is required is for difference to be resolved into experiences that construct democratic and civic relations (...) What is at stake is not just the problem of the existence of others as a historically and culturally produced difference, but the fact that the *self* is deterritorialized and reterritorialized, and thus resignified in the sense that it ceases to be a closed identity in terms of membership of a nation, a race, a social class, a political organization, a profession, an academic community, etc., and becomes a plural space in which multiple narratives and languages interact" (Téllez, 1998, pp. 136-137). Opening up to difference, then, is not just a politically correct exercise in tolerance towards others. It involves people being transformed by the development of their ability to put themselves in the place of others, enrich themselves with others' world views, enlarge their own sensibility with that provided by the experience of difference. Thus, "educating people in respect for diversity, recognition of the other and the exercise of solidarity are preconditions for the growth and enrichment of one's own identity" (Cubides, 1998, p. 45).

Cultural challenges to education are also intensified by the dynamism of identities in media interaction: the existence of differences in close proximity owing to the increase in migrants and their families, the segmentation of tastes due to increased supply in culture markets, the greater visibility of the ethnic issue in politics and the media, hybridizations between new and old and between local and external. All this undermines the rigid, general ways in which education and culture

have traditionally interacted and challenges the education system over those very historical referents that governed it for so many decades: the same education for all, long-running syllabuses decided on by the centre, a universal and traditional conception of the culture to be transmitted, and cultural unification through formal education. Both learning processes and the shared school environment are divided between an educational imaginary tinged with aspirations towards unity and new realities in the field of knowledge and everyday life that fill students' minds with all sorts of contrasting texts. These tensions require new cognitive syntheses and maps, and so far the formal education system has not been creative enough to take up the challenge.

The idea of providing an education that takes account of the cultural processes and contexts of those educated brings us back to some of the premises of the critical pedagogy that Paulo Freire proposed in the 1960s and 1970s, the aim of which was to bring education closer to the sociocultural realities of students and provide a critical, transformative perspective on the reality they live in.³ In a paper summarizing case studies of Internet applications in deprived schools in Latin America, it is suggested that in rural schools in Argentina "success depended essentially on the ability to adapt the Internet to the needs and environments of local communities (...) following principles that enabled knowledge to be exchanged in an equitable, horizontal way" (Bonilla, 2001, p. 10).

José L. González suggests the "critical approach" as a pedagogic exercise, basing it on a constructivist model of teaching and learning. His objective, he states, is to "decode messages and contents by analysing, ranking and ordering the information put out by the media and the new information technologies", and "bringing communication and media educational material into the classroom and establishing it there means opening up the school to the outside" (González, 2000, pp. 4 and 5). The idea is to use the media in education as a tool for expression and questioning, i.e.,

as a teaching practice that is also a preparatory exercise in civic participation.

At the same time, the importance of education for the exercise of citizenship is defended. The argument is that as knowledge and education become progressively more central to development, they are having a significant effect on the dynamic of a democratic order in which the economy and political institutions relate increasingly to the broader use of knowledge, information and communication. To an ever-growing degree, the processing of demands in the decision-making process is going to be done through the new information and communication technologies, and citizens are going to have to be well-informed, develop management capabilities and operate by the codes of the information society if they are to make use of State or public services and benefits. All this means that education and knowledge will be more and more central in promoting the new forms of citizenship as well.

Between old and new functions, then, education can be seen as a hinge upon which three great aspirations of modernity turn: the production of human resources, the construction of citizens so that they can act in politics and public life, and the development of autonomous agents. I use the words production, construction and development deliberately here to refer to human resources, citizens and autonomous agents, respectively. I think this semantic detail differentiates and at the same time complements the instrumental, political and ethical components in the challenge of educating for modern life. In its history and its promises, it is precisely this threefold dimension that modernity enshrines for those who dwell in it: growing in productivity, in the exercise of citizenship and in personal autonomy.

Education, then, is placed both on a pedestal and in the dock. Observers are aware of how anachronistic and dysfunctional much of the educational heritage is. The flags of autonomy, decentralization, selectiveness, modernization, deregulation and others are hoisted at ministerial meetings and in press articles and turn-of-century documents. Education ideologues, futurologists, development theorists and politicians and experts from international agencies are increasingly given to proclaiming, and warning, that formal education systems in Latin America stand in urgent need of reform so that they can provide a platform for "relaunching" development. All this implies a radical readaptation of content, teaching methods and education planning. This is obviously a far from easy task, as it

³ According to García and Pruyt (2001, p. 6), "At the heart of Freire's approach (...) students are encouraged to take up subject positions as critical analysts and agents" and "critical teachers following this philosophy are encouraged to engage learners and students in discussions and investigations of their lived realities and problematic situations. The concerns, needs and personal experiences of the students are at the centre of this process." See also Freire and Macedo (1987).

means shaking up the very settled habits of ministries, secretariats, teaching staff and those who run educational establishments.

In this educative impulse upon which all converge, the instrumental requirements of productive modernization are intertwined with the more complex ones of subjectivity and culture. There is the risk of placing too much faith in a process whose quality and attainments depend on as many variables as those of

education do. There is the risk, too, that education might become settled just at a time in history when the channels linking the education system with labour markets are fragmenting and when the urgency of inculcating the instrumental skills required for competitiveness might end up by crowding out other aspects of education that require a different pace, those concerned with learning how to experience emotions and process personal histories.

II

Where we stand with education

Latin America has achieved high levels of school enrolment over the last decade, so that this problem is now considered to have been virtually overcome at the primary level. The net primary enrolment rate for 8-year-olds is 96.3%, although the pre-school rate is only 23%.⁴ In higher education, the attendance rate does not exceed 35% (as a national average) in any country of Latin America. Furthermore, the countries of the region have a serious problem with the school drop-out rate in secondary education. To confirm this, it is enough to compare the high enrolment rates in primary education with the very much lower ones seen in secondary education. This is all the more serious if we consider that, in different documents addressing the relationship between education and well-being, ECLAC has argued that 11 to 12 years of formal education are required for people to have a clear prospect of obtaining work that is well paid enough to lift them or keep them out of poverty. In the region, however, 40% of children do not complete primary school and between 72% and 96% of poor families have household heads with less than nine years of formal education, while 80% of young people in cities have parents with less than 10 years of formal education, which makes it especially likely that they will not achieve the level of education required to keep out of poverty (ECLAC, 2000).

Furthermore, there is a serious problem of social inequality in education. According to ECLAC figures, the attainment gap between the top and bottom income quartiles (1 and 4) widened in all Latin American countries during the 1990s. In other words, intermediate and higher education still have a class bias,⁵ unlike primary education. This is serious, since statistics show a positive correlation between education and equity, which means that the countries whose educational attainments are most widely spread also have smaller income differentials and are more egalitarian in their social structure. There are large disparities in educational attainments (both in the number of years studied and in the quality of learning) by income group, resulting in the reproduction of social inequities. The more segmented attainments are, the more rigid the structure of social groups will be in future and the more segmented the opportunities of new generations in terms of social mobility, productive development and the capacity for civic activity and intercultural dialogue. In a society centring on information and knowledge, the opportunities for different groups to realize their life plans in accordance with their own values and views of the world will largely depend on the quantity and quality of the education they are able to receive. This at least is the consensus view.

⁴ The data on education coverage presented here were obtained from the ECLAC Statistics and Economic Projections Division, the UNESCO web site and UNESCO (2000a).

⁵ Other than in countries, such as those of the Southern Cone, where an ample majority go into secondary education.

Thus, for example, in the last 30 years nations such as Cuba, Spain and Portugal have expanded secondary and tertiary coverage quickly and steadily to levels far above the Latin American average. And contrary to the emerging thinking on education, which associates greater efficiency with less direct State intervention, these countries have achieved those high rates of growth with a public-sector education system and strong State planning.⁶

The question, therefore, is whether these shortcomings and the slow pace at which they are being overcome are inevitable given the constraints on resources. The answer must be no if we compare the rates of growth at the secondary and higher levels in Latin America with those of the OECD countries and South-East Asia (table 1).

As table 1 shows, between 1985 and 1997 the relationship between the newly industrializing countries of South-East Asia and those of Latin America and the Caribbean was reversed: the former started off behind, but in 12 years they were clearly more advanced educationally, whether the measure be enrolment or performance in tests standardized by level, hours of actual teaching per year and other indicators. Over the same period, the Organisation for Economic Co-operation and Development (OECD) countries, which started off in a considerably better position than those of Latin America, pulled even further and more quickly ahead. Latin America also lags behind in the duration of secondary schooling (shorter in the region than in other groups of countries) and years of compulsory education. Furthermore, in the OECD countries 85% of young people complete secondary education as against less than a third in Latin America.

There are also differences between Latin American students and those in industrialized countries as regards the quality of learning in mathematics and language use, as measured by standard reading, mathematics and science tests, with our countries clearly coming off worse (table 2). This gap looks all the harder to close if it is considered that the industrialized countries, which account for 25% of the world's students, spend six times more on human capital than the developing countries, where the other 75% live, and that in 1999 or thereabouts the developed countries, with 15% of world

population, were home to 88% of all Internet users (Brunner, 1999, p. 2).

The proportion of supply and enrolment for technical education at the higher secondary level (i.e., in the last two or three years of secondary schooling) displays significant differences, being far higher in the OECD and South-East Asian countries than in Latin America. These differences are very important, because the higher secondary level is vital both for improving the general capabilities of the workforce and for achieving desirable effects on equity and social mobility. The experience of some European countries also shows that a larger and better supply of technical and occupational training at this educational level, and in non-university higher education, has very positive effects on the results achieved by students when they enter the labour market and tends to raise productivity generally. Lastly, the low coverage and quality of these alternatives means that an opportunity is being missed to provide a broad training in the productive use of information and communication technologies which, to the extent that they are approachable and motivating for young people of school age, could be the subject of mass training courses of a vocational or technical type at the higher secondary level. This educational segment is perhaps the most suitable for providing mass access to these technologies for a generation of young people in our countries and training them to use them creatively. This would mean quantitative and qualitative progress towards an information technology society, the development of production and communication capacities and the ability to exercise citizenship and connect with the world.

Another fundamental gap is in the incomes of teachers, since teaching conditions obviously have a decisive impact on students' learning. In the region, teachers in the public sector earn on average only a fifth of what teachers in developed countries with the same number of years' experience are paid for the same hours. Although this difference is consistent with the gap in gross domestic product (GDP) between the two groups of countries, it does entail a large disparity in the conditions under which teachers work to impart education and update their own knowledge and methodologies. Furthermore, the ratio between the incomes of teachers and those of other groups of professionals is smaller in the industrialized countries than in the region.

How do these differences in education levels between Latin America and much of the industrialized (or newly industrializing) world correlate with cultural

⁶ I point this out not to defend statism but to suggest that the enthusiasm for privatizing social services in some countries may have been overdone.

TABLE 1

Groups of countries: Comparison of secondary and higher education enrolment in Latin America and the industrialized world, 1985 to 1997
(Percentages)

Groups of countries	Gross enrolment rates					
	Secondary education			Tertiary education		
	1985	1997	Percentage rise in enrolment rates	1985	1997	Percentage rise in enrolment rates
Latin America and the Caribbean	50.2	62.2	12.0	15.8	19.4	3.6
OECD countries	92.3	108.0	15.7	39.3	61.1	21.8
Newly industrializing Asian countries ^a	57.3	73.1	15.8	14.8	30.5	15.7
East and South-East Asia ^b						

Source: Beverley Carlson, on the basis of UNESCO (2000b) data.

^a China, Hong Kong, Malaysia, Republic of Korea, Singapore and Thailand.

^b Only developing countries (not industrialized, including newly or incipiently industrializing).

TABLE 2

Latin American countries: Ranking in international studies of education quality

Study	Countries participating	Latin American countries	Ranking
LLECE 1997	13	13	The average scores of the top-ranked country differ from those of the other 12 countries by between 1.5 and 2.0 standard deviations
TIMSS 1996	41	3	31, 37 and 40
TIMSS 1999	38	1	35
IALS 1998	22	2	19 and 22
IALS 1998	22	2	21 and 22

Source: Laboratorio Latinoamericano de Evaluación de la Calidad de la Educación (LLECE), International Adult Literacy Survey (IALS), Third International Mathematics and Science Study (TIMSS) and OECD (2001).

gaps? International experience and the world situation point to at least three plausible conjectures.

Firstly, globalization is having a very powerful impact on local cultures, both for better and for worse. For better, because the globalization of communications, particularly with new technologies, enables local cultures to become active participants in the planetary dialogue and more strongly assert their identities, demands and views of the world. For worse, because relationships of dominance, hegemony and acculturation arise in this great borderless flow of symbols and goods. In this mixed situation, access to knowledge seems to be a key to enhancing the positive aspect and mitigating the negative effects. The better and more highly educated people are, the better they can handle long-distance interaction and the more able they are to affirm their own identities and manage and mobilize their demands for a greater presence in the

global dialogue and a greater impact on “global civil society”.⁷

Secondly, the differences in education levels have also created a wider gap between the industrialized and developing worlds, and this gap seems harder and harder to bridge, condemning the developing world to the dismal status of globalization’s backyard. This situation can have a variety of effects, all of them catastrophic: cultural withdrawal and/or entrenchment, mass discouragement, loss of utopias and collective projects and, most notoriously, the rapid rise of

⁷ One factor that tends to be overlooked in attempts to explain the greater assertiveness of Latin American indigenous groups in the last two decades is the university education received by their new leaders.

fundamentalisms of different kinds as a way of reacting to and compensating for exclusion and stagnation.

Thirdly, education, is the most massive, systematic and established tool available for socializing the new generations in multiculturalism, the new global democratic imaginary, the discourse and practice of human rights, learning about difference and the adaptation of universal knowledge to personal or group sensibilities.⁸ Furthermore, as educators correct ethnocentric biases of their own and education reverses its historical purpose of cultural homogenization, it is possible that the new learning processes might open the way for radically different ones. Furthermore, by thematizing historical acculturation or homogenization and making them subjects of debate in the classroom, it is possible to promote affirmation of the identities that come together in that same classroom.

And what do States do in this situation, where the succession of educational achievements has not accelerated as hoped, education quality is unsatisfactory in different areas,⁹ great inequality of achievement due to demand and supply conditions is found to persist when results are broken down by socio-economic stratum and between town and country,¹⁰ and education system management has entered a deep crisis and an exhaustive process of reform?¹¹

⁸ This obviously depends on the type of education provided, but it can be an instrument for these purposes.

⁹ The range of quality problems is very large and includes the following, among others: the irrelevance of pedagogic material to students' worlds of life and working futures; anachronistic teaching methods whose continuing focus on rote learning and head-on methods owes little to the new ways of acquiring and transmitting knowledge; the decline in teacher quality owing to poor living and working conditions and a lack of symbolic recognition; lack of appropriate equipment (textbooks, computers, audio-visual aids); very short school days or overcrowded classrooms; lack of support for learning conditions in the home, and lack of intermediate technical training options.

¹⁰ On the demand side, the educational environment in the home is crucial to students' educational attainment: families with a low level of education (usually on low or medium-low incomes) tend to reproduce low attainment in their children. Furthermore, poor families do not have computers or access to information and communication technologies, which puts them at an ever more dramatic disadvantage when it comes to the development of new skills in the home. On the supply side, increasing private expenditure on schooling as families attach greater and greater importance to their children's education is continually widening the education standards gap between private and public-sector schools.

¹¹ Partly because the large increase in the number of young people enrolled over the last five decades has overwhelmed a system

Since the 1980s, recognition of these problems has led virtually all the Latin American countries to embark on reform, increasing human and financial resources to drive qualitative leaps in the teaching and learning of new generations. Although the emphasis has varied by country,¹² the reforms as a whole seek to act systematically on the most varied aspects of education, namely: curricular content and teaching methods; funding mechanisms; redistribution of functions between the public and private sectors; decentralization of education management, with responsibilities being handed over to municipalities and schools themselves; review of teaching practices and evaluation of achievements, and the beginnings of efforts to adapt curricula to new patterns of production and the sociocultural situation of students.

There has also been criticism in the different countries of the region, however, of the biases displayed by the current reforms. It is argued that the reforms are too technocratic, concentrating on financing and management mechanisms but not on content or actual teaching processes. It is objected that the emphasis on quality has come at the expense of the increased social equity in learning and educational attainment that is so urgently needed, and that the new ways of combining public and private action have led to increased segmentation in the quality of supply, and perhaps thence to the reproduction or exacerbation of social contrasts in future and decreased State responsibility for or oversight of schools and universities. It is claimed that the quality of teaching has not improved because teachers are still poorly paid and undervalued, and because neither the style nor the content of formal education has been successfully adapted to the cultural changes experienced by students in recent decades, particularly where media consumption and new youth imaginaries are concerned. It is maintained that the reforms are tending to prioritize knowledge that is functional to technological development and future production capabilities at the expense of less

designed for a different scale, partly because the State bureaucracy and the corporate behaviour of the system have accumulated certain "historical vices" that undermine the efficiency of public policy, partly because the system needs to be opened up to potential contributions by the private sector and other agents so that its practices can be improved, and partly because of the need to target resources on the most vulnerable groups and adapt education content to the sociocultural circumstances of students.

¹² For example, enthusiasm for decentralizing the system or giving a leading role to the private sector is not universally shared.

instrumental aspects of learning, such as self-expression and self-knowledge. And it is suggested that what is needed is to go back to the root of the education problem by asking about the meaning of education rather than

its utility and by realizing that an excessive focus on performance can lead to neglect of the really important goal: the emotional and intellectual development of students.

III

Differences of access and differences of meaning: how education interacts with information and communication technologies

1. Differences of access and ways to correct them

If a high-quality education is essential for the steady incorporation of large numbers of people into the knowledge society (and the globalization based on that model), access to communications is also essential, as not only is labour productivity at stake here, but symbolic integration as well. Density indicators for the audio-visual industry and audio-visual consumption, and for information technology and connectivity,¹³ are becoming increasingly significant for the analysis of cultural trends, mainly because information and communication technologies will be more and more important in promoting cultural visibility, i.e., in enabling different cultural expressions to achieve a presence in the global media dialogue, as well as in the domestic political arena and public spaces.

Domestically, the communication industries provide the most important means of access to the public space for large sectors of society that lack means to express themselves, and thus offer the best opportunity for active civic participation. As of late 2002, communications density in the region was heterogeneous, varying from one medium to another. While most households had television, only 16% of them had fixed-line telephones, 20% of the population had mobile telephones, 8% had Internet access and just 0.3% had access to broadband (Hilbert, 2003). These

figures show that while a substantial part of the population has access to information, images, content and messages transmitted by others at a distance (and of which they are only passive recipients), few are in a position to communicate over distance on a one-to-one basis, and fewer still have access to long-distance interactive media that enable them to act as transmitters to larger groups.

If connectivity with interactive media is a crucial indicator of participation in the information and knowledge society, the contrasts observed between the United States and Latin America in 2002 are striking (ITU, 2003): while in the former there were 63 personal computers, 54 Internet users and 37 hosts per 100 inhabitants, Uruguay led the Latin American countries for hosts (2.1 per 100 inhabitants), Chile for users (20) and Costa Rica for personal computers (17.02).

When the different regions of the world are compared, the contrast in access to two-way communication goods (such as telephones and the Internet) is disturbing. At present, the 20% of the global population living in the poorest countries has just 1.5% of all telephone lines, while the 20% of the population in the richest countries has 74%. Regarding access to and presence on the Internet, it is also worrying that, according to the 1999 Human Development Report (UNDP, 1999), just 2.4% of the world population had Internet access, chiefly in industrialized countries, and 80% of all Internet communications took place in English (Brunner, 1999).

How far behind Latin America has fallen is also illustrated by the fact that in 1999 the region accounted for 8% of world population but only 4% of cyberspace

¹³ By connectivity is meant access to interactive electronic networks.

activity; although it creates about 7% of world GDP, it is responsible for only 1% of all electronic commerce in the world (Hilbert, 2001a).¹⁴ By contrast with these discouraging data, over recent years Latin America has seen the fastest expansion of its "Internet community" of any region in the world. While in 1999 the number of hosts increased by 30% in Europe, 61% in Asia and 74% in North America, the rise in Latin America was 136% (Hilbert, 2001a). This growth in access also reflects growth in electronic commerce, which began around 1998 and stood at US\$ 20 billion in 2002, 1% of Latin American GDP (ECLAC, 2003). In short, things are bad, but they are not going that badly.

If being outside the web means being symbolically deaf or shut out, the asymmetries between the connected and the unconnected represent an almost ontological divide. At the same time, connectivity is heavily skewed towards urban and metropolitan areas: in Argentina around 1999, 87% of all web sites and their physical locations were in the Federal Capital and Greater Buenos Aires. In Chile, Internet use is even more concentrated in Santiago than are population and GDP, and the percentage of electronic commerce that takes place in the capital is twice as great as the percentage of the country's population living there. As for segmentation by social strata, according to estimates by Emarketers 18.1% of the richest 15% of the Latin American population were connected in early 2000, but only 2.7% of the total population. By 2004, 68.9% of the richest 15% of the Latin American population aged 14 and over are expected to be connected, but only 10% of the total population aged 14 and over (Hilbert, 2003). According to the same source, 81.8% of the richest 15% of the Brazilian population is expected to be connected by 2004, as against 12.3% of the total population. If the web is the new focus of civic participation, what kind of participatory democracy can be expected with segmentation indicators like this?

Lastly, the Internet is creating surprising age segmentations. In Brazil, according to 1999 data, 15.8% of 14 to 19-year-olds had used the Internet, as against 11.3% of 20 to 35-year-olds, 5.6% of 36 to 45-year-olds and 3% of over-46s, while for personal computer use the figures by age group were 27%, 19%, 13.7%

and 6.3%, respectively.¹⁵ The data on mobile telephone and Internet use in Chile and Mexico also reveal much greater prevalence among the young (figure 1). If these national situations can be extrapolated to other countries in the region, we can expect the generation gap to widen in future, since Internet use results not only in productivity differences but also in asymmetries in interlocution capacity, access to information and knowledge, cultural development and other aspects. Meanwhile, the data also reveal that ethnic discrimination is reproduced in access to audio-visual and information technology goods. The non-indigenous part of the population is five times as likely as the indigenous part to have a computer in the home, but only twice as likely to have a television set (figure 2).

The hopeful feature is that, despite the differences, connectivity is now spreading faster in Latin America than in any other region, and the proportion between access and equipment has improved by more than in other regions. The problem of network access diminishes as the cost of the equipment required for households to access microcomputers and the Internet falls, enabling connectivity to spread from higher-income to middle-income families. Apart from this, the need to "democratize" connectivity, i.e., spread it throughout the whole of society, has hitherto been addressed in three ways. First, there are the highly targeted programmes initiated by non-governmental organizations (NGOs) and some State or municipal programmes connecting up small groups in what is still an experimental way. The cases most often cited in Latin America are those of indigenous movements and community organizations that use the Internet to enlarge alliances, create a presence in the virtual public space, mobilize politically and obtain information on markets, loans and other services.

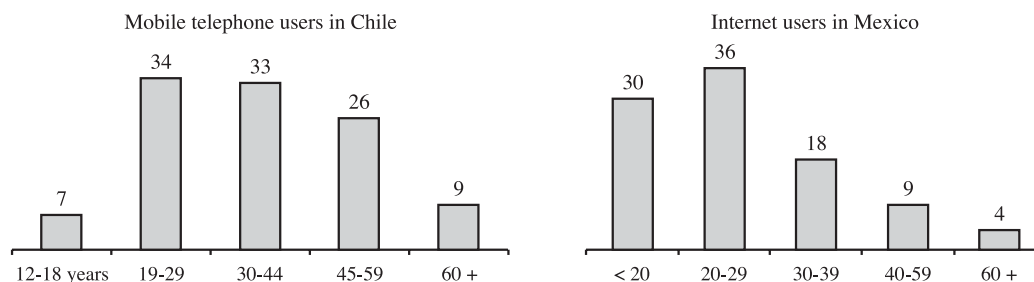
A second method is the provision of public facilities where people pay diminishing amounts to go on the Internet. The third, and the one that probably has the greatest potential to democratize access, is the provision of networked computers in State schools as part of public-sector educational reform programmes whose aim is to bring electronic networks into formal education as a learning tool. In these last two cases, the starting premise is that the digital era is defined not by ownership of computers but by access to the web; the most important capital is learning, not the machine. In

¹⁴ In 2000, Brazil accounted for 69% of all electronic commerce in Latin America (Hilbert, 2001b). In general, commerce of this type is expected to increase exponentially, from virtually nothing in 1999 to about US\$ 100 billion in 2004 (Hilbert, 2001b).

¹⁵ Brazilian Ministry of Health data, cited by Hilbert (2001b).

FIGURE 1

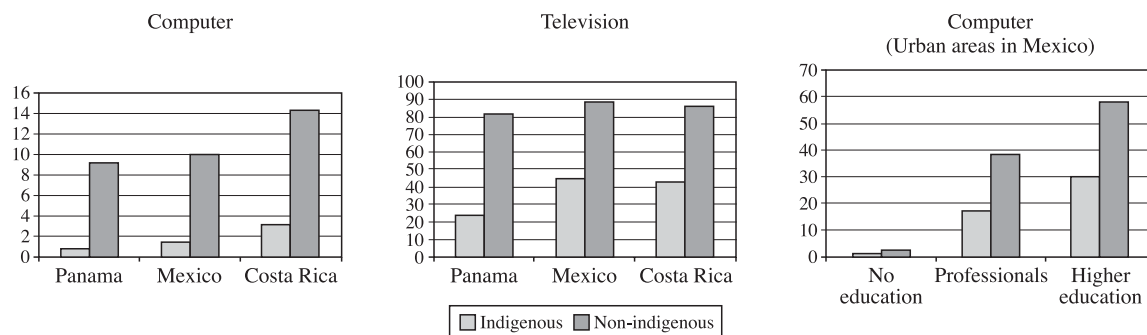
**Penetration rate of information and communication technologies,
by age group, 2002**
(Percentages of each group)



Source: SUBTEL (2002) and TNS (2002).

FIGURE 2

**Proportion of the population with a computer/television
in the home, by ethnic origin, 2000**
(Percentages)



Source: Microdatabases in Panama, Mexico and Costa Rica, 2000 census round.

countries such as Peru, Internet use is spreading not through computers in the home but through Internet cafes and public booths, while in countries such as Brazil, Chile, Costa Rica and Mexico, growth in user numbers is being driven by network installation in schools. If Chile is now the Latin American country with the highest connectivity index, this is essentially due to the success of its programme to install interconnected terminals throughout the education system.

Education coverage in Latin America is close to 100% at the primary level and is rapidly increasing at the secondary level. It is at school that children and young people are institutionalized and develop day by day their ability to learn and interact with their peers. At the same time, large social differences and high poverty rates in many of the region's countries mean that the great majority of households do not have a computer. It is in schools, then, that access can be

democratized. Furthermore, the shared use of terminals there offers positive synergies for the learning of computer languages, confidence and skill in cyberspace and the use of electronic networks to process information and construct knowledge relating to the school curriculum. Socializing in networks should be part of the socializing mission of schools.

In the region, there have now been numerous national initiatives to equip State schools for interactive media, with variable levels of success, coverage and continuity. Brazil has launched the Programa Nacional de Informática na Educação (National Programme for Computers in Education, or ProInfo) and, for communications media, the Programa Nacional de Educação a Distância: TV Escola (National Programme for Distance Learning: School TV), which supports teaching in the public education network by providing assistance with methodology, teaching technologies and support material for classroom work through a

television channel dedicated exclusively to education. In Costa Rica, the Programa de Informática Educativa (Educational Computing Programme), operated nationwide since 1988 by the Ministry of Public Education and the Omar Dengo Foundation, seeks to improve education quality by using computers in State primary schools. In Chile, the Red Enlaces (Links Network) project run by the Ministry of Education has created a computer-based inter-school communications network among students, teachers and professionals from other education-related institutions. This was started experimentally in 1992 and by 2001 some 62% of primary schools and 89% of secondary schools in the country were connected to the Internet through the Enlaces programme. Other countries including Argentina, Uruguay, Mexico and Cuba are also engaged in creating and extending school connectivity.

Some questions arise concerning the route taken by school computing programmes in the region's countries. The first relates to "computer density", i.e., the number of students sharing each computer in schools. This is crucial, because frequent, personalized access is essential if students are to familiarize themselves with computers and make good use of them. In Chile, which is one of the countries with the highest levels of school connectivity, it has not been easy to bring down the number of students per computer: this was estimated at 71 in 1998, falling to 65 in 2001 (Jara Schnettler and Pávez, 2001). In the United States, the ratio was 1 to 125 students in 1981, falling to 1 to 5 in 2000 in the case of computers without a multimedia connection and 1 to 10 for modern multimedia computers with a network connection (Cuban, 2001). The second question concerns the response of teachers, who tend to feel threatened by the greater rapidity with which students develop computer skills and watch anxiously as the gap between virtual culture and pedagogic culture widens. Given how little Latin American schoolteachers earn and how little free time they have for retraining, they are unlikely to be able to familiarize themselves with computers on their own account. A few free hours therefore need to be found in the timetable so that they can be trained in the schools themselves, as there is little likelihood of their having good equipment at home. The third question has to do with the prospects for keeping computers constantly updated and maintained once they are installed in schools, as this entails ongoing investment over and above what is provided under the initial equipment provision programmes.

Among the lessons learnt from the Chilean case and applicable to other national situations in Latin America, the following are important (Jara Schnettler and Pávez, 2001). Firstly, the introduction of information and communication technologies in the school system is a slow process whose pace is closer to the gradual one of cultural change than to the short time-horizon of elected governments. Secondly, innovation should be incremental and unforced, which means that the spread of these technologies should be coordinated with the pedagogic needs of teachers by supplying the latter with tools (equipment, software, guides) that are easy to understand and use. Thirdly, the provision of resources and skills cannot be uniform across the system, but must be adapted to the different needs of teachers and students in schools with very different learning environments. Fourthly, this aspect of education reform needs to be coordinated with others, so that synergies can be generated between school computerization programmes and programmes to create classroom libraries, change curricular content, develop the transversal curriculum and so on.

Lastly, it is not clear to what extent greater provision of computers, a better ratio between student and computer numbers and connectivity for all are sufficient conditions for really fast progress in computer literacy, learning capabilities and future prospects of higher occupational productivity for students. An exhaustive study (Cuban, 2001) conducted in the United States in the 1990s, the decade when the country did most to equip schools with computers, and paying particular attention to Silicon Valley, the area where computing is most highly developed, leaves a great many doubts. According to its author, there needs to be some scepticism about the enthusiasm of businesses and experts who believe that more and better computer technologies in schools will synchronize learning processes with the challenges of work in modern market economies.

The study notes that during the last two decades of the twentieth century, the United States Federal Government invested unprecedented sums in equipping all the State schools in the country with these technologies, with the fervent support of parents, company executives, public officials and educators, thereby democratizing access. What has not been confirmed in practice, though, is the assumption that drove this investment, namely that greater access in classrooms automatically leads to greater use, better and more efficient teaching and learning, and thence greater preparedness for work. Following a large-scale

review of the data and case studies, Cuban arrives at four unsettling conclusions. The first is that there is no real consensus as to what computer literacy is, i.e., whether it simply means using a computer with basic software or, for example, having the ability to download programs, update software and the hard disk, etc. The second is that in the 1990s the United States did not evince any major change in the quality of teaching and learning, as measured by increased academic achievement among urban, suburban and rural students, that might be attributed to increased computer access. The third is that teachers continue to be limited and occasional users of new technology where teaching methods in the classroom are concerned, however much they might use computers for administrative purposes. And lastly, school equipment levels have no clear impact on future access to highly paid jobs, since the students who subsequently obtain the best jobs usually attribute their skills to the use of computers outside school (Cuban, 2001).

2. Divergent perspectives among information and communication technologies, culture and education

The technologies we use to interact in the virtual world have a dialectical relationship with culture. As Manuel Castells puts it, many features of the information technology paradigm, such as interconnection, porosity and flexibility, also become cultural traits (Castells, 1999, pp. 88-89). On the one hand, values characteristic of Western modernity are manifested in this turn-of-century setting by a paroxysm of mass communication in a virtual world: the speed of movement, the multiplication of interlocutors, the dissolution of national frontiers and spatial restrictions, the infinitesimal disaggregation of knowledge, the autonomy of individuals and their resistance to exogenous regulation and, as Paul Virilio would say, the usurpation of public affairs by public images, of faces by spectres, as though the new information and communication technologies gave material expression to the characteristic features of postmodernity or late modernity. At the same time, though, the use made of these technological devices as we traverse virtual space acts upon the very cultural frameworks that confer a certain destiny on technology. Thus, technology and culture are dynamically intertwined.

The new branches of the culture industry and information and communication technologies are radically redefining communication, access to

information and the way knowledge is produced. They are blurring the boundaries between active learning and passive receptiveness, between the roles of transmission and reception, between settled culture (values, religion, inherited knowledge) and contingent culture (video clips, soap operas, video games, chat, etc.), between high and low culture, between the erudite and the popular, between the national and the exogenous. The regime of rapid obsolescence that rules cultural markets and industries is changing people's perception of what, when, where and why they know and learn. Information is becoming so accessible, immediate, varied and detailed that the traditional figure of the tutor or teacher is losing meaning for the many children who enter and leave the world of their computer terminals as naturally as eating or walking. In its potential for continuous dialogue, culture is opening up in all directions, decentring its places of production and processing.

With change on this scale, education is being rapidly called into question. It is not easy for the State to dominate the field of education when there are these new sources of information, culture, knowledge and entertainment, combining the educational and informative functions of the light culture industry with those of the heavy culture industry. There is no one formula for incorporating the new media into a classroom routine, or for coordinating joint operations between the new output of the culture industry and the challenge of modernizing education in sectors with low and medium-low incomes, or for organizing the retraining of education staff (teachers, planners and educational "managers") to deal with these challenges, or for using installed capacity and its impact on the vast majority of households to implement environmental education, consumer education and responsible parenthood education programmes, among others.

Can there be any doubt? Audio-visual media use and access to interactive networks are a powerful tool for extending and democratizing learning opportunities among different income groups. The introduction of computer and audio-visual aids is a major contribution to education, as it enriches teaching and learning methods, makes up-to-date knowledge and information of all kinds accessible to students and teachers, revolutionizes teacher training, facilitates distance learning, improves the efficiency of educational management and makes learning more participatory.

On the other hand, though, education has to reconcile new skills with the cumulative tradition of thoughtful, critical reflection. Media euphoria cannot

sweep away pedagogic memory; rather, we need to find ways of using the new devices to enhance learning without thereby destroying the deeper meaning of learning. It is true that an encyclopaedic approach to education may be obsolete once information is stored on hard disks. But the same is not true of the humanism with which it was associated. Today more than ever we need a critical approach to instrumental reason (as a type of reason that nullifies other rationalities), the ability to distinguish selectively between the advantages of message transmission technologies and the risk of reducing spirit to the logic of mere transmission, misgivings about an overdose of media stimulation when this is reduced to pure sequence, and personal assertiveness to avoid being overwhelmed by the seduction of so many textures moving over the textureless surface of the monitor.

Here is the limitation and opportunity for education. On the one hand, to capitalize on the new learning materials in order to democratize access to productivity, citizenship, communication and the diversification of daily life. On the other, to mobilize its own heritage to ensure these materials are used in a way that does not lead to passivity or the unbearable lightness of being. There are no clear formulae to determine what needs to be discarded and what kept in pedagogy and the curriculum. In multimedia time and space there is no need to internalize the encyclopaedia: it is enough to know how to bring it up on the monitor. But the monitor does not teach you how to switch off the monitor.

There is also the drama of Latin American schools failing to absorb the new languages that students themselves bring to class. Narrowness comes from both sides, then. It is necessary to understand that “the transformation of ways of reading... is cutting away the ground from beneath the obstinate identification of reading with books rather than with the plurality and heterogeneity of texts, stories and writings (oral, visual, musical, audio-visual and telematic) now in circulation” (Martín Barbero, 1996, p. 12). And Jesús Martín Barbero is right to point out that television rivals school in a profoundly epistemological way, since while television “delocalizes” knowledge, blends it, uses it discontinuously and spasmodically in pursuit of entertainment and withdraws it from the “institutionality” whence it arose, school remains at the antipodes, dealing with long time periods, systematic thought, effort and discipline. Furthermore, television is now the place where “frontiers shift between reason and imagination, between knowledge and information,

nature and artifice, art and science, expert knowledge and worldly experience” (Martín Barbero, 1996, p. 14). For schools, there is the challenge of breaking out of the defensive position they have taken up in response to mass communication, using the plasticity of the mass media to transmit and combine knowledge while at the same time organizing this mosaic of media stimuli in such a way as to prevent knowledge being reduced to banality and to nurture in students a spirit of selectiveness towards what Baudrillard called communicational ecstasy.

Orozco (1996) suggests going beyond the two antithetical views of education vis-à-vis the communications media: the defence of the audience against the media, and the uncritical acceptance of the latter as an educational modernization resource. He proposes instead a “critical pedagogy of representation” that opens a debate on media receptiveness in the classroom, treats school as one institution among others competing to exercise hegemony over knowledge, inculcates skills that enable students to express themselves in a multimedia environment and regards literacy training as an ongoing process for the different alphabets –media, multicultural and that of ever-faster change– of a postmodern world.¹⁶

Where the new information and communication technologies are concerned, education is faced with at least three major long-term changes. Firstly, educating by means of new information and knowledge technologies involves linking their use in some way with the production of meaning, both individual and collective. This production of meaning is nourished, in turn, by people’s own culture. The idea, then, is not to transmit an “amnesiac euphoria” but to inculcate a taste and responsibility for the encounter between culture and technology, identity and alterity, ends and means. As Jesús Martín Barbero put it, education has to be a suitable space for moving from media to mediations.

Secondly, virtual interaction draws on a hypertext in which reading and writing, oral communication and image culture mingle. Its immediacy is oral, while typing is the basic motor action. The pre-eminence of one over the other may depend on what users decide in accordance with the way they visualize the interlocution of the moment through the screen. They may prefer written, acoustic or visual communication depending

¹⁶ See Orozco, 1996.

on the occasion and the effect desired. This undoubtedly affects the way knowledge is acquired, processed and transmitted. If school curricula are based on written culture and compartmentalization of genres and subjects, the hypertext of virtual communication transcends frontiers and watertight compartments. It is a matter not just of content, but also and mainly of learning and teaching styles. By the same token, changes in virtual practices challenge the basis of the system. How much should the teaching system be revolutionized to enhance learning through the new information and knowledge devices? There are no unequivocal answers to this question. Change may of necessity have to be rather gradual, given that teacher training and practices do not move at the same pace as innovations in information and communication technologies.

Lastly, virtual interaction oscillates between means and end. When people "chat", communication is the object and there is nothing that transcends it; but if we are looking for a piece of scientific information to use in our research, the virtual search is only a means. On this point, too, education is caught between the pedestal and the dock, so to speak. Children and young people of school age tend to use the web in a playful, unorganized way. What is appreciated, in other words, is "virtual immanentism" and not the potential of the web for gathering knowledge. The risk of this interchange of priorities is that the ability to organize knowledge and learning dynamics may be lost. The role of the teacher, and of education planners, must include the capacity to provide a context in which the use of computer and communication technologies in schools retains a relationship between means and ends such that communication is used to acquire and process knowledge in an ordered, holistic way. Critical thinking and a healthy dose of encyclopaedism (properly understood) have to provide the basis for learning practices that use these technologies. Otherwise, there is the risk of energy being wasted on uncoordinated acts of communication that neither construct nor systematize the information they generate.

To sum up: on the one hand, there can be no doubt that there is an urgent need for information and communication technologies to be widely incorporated into education, because this is the quickest and most economical way of closing the digital gap on a mass scale, between and within countries. If social inclusion increasingly depends on access to knowledge, participation in networks and the use of up-to-date information and communication technologies, the

formal education system is the key to widening this access. On the other hand, this does not mean that the "digitization" of education inspires us with knowledge and frees students from all traces of false consciousness and ignorance. There is nothing to guarantee how the tensions between school culture and youth culture and between instrumental reason and sense production will be resolved, computer or no computer. But these tensions can only be resolved on the move. And for there to be movement, schools have to be equipped. This is the double-edged sword for education: using the multimedia industry as a source of motivation, expressiveness and new forms of literacy, but without losing the critical spirit or the accumulated heritage of the learning experience. There are no clear formulae for this: just trial and error, and learning from the experience of others.

3. Questions

We know that most schools in the region still have severe shortcomings in teaching styles and curricular content. We know that, like learning a new language, it is far easier for children and adolescents to familiarize themselves with virtual networks than it is for adults. We know that the cost of computerizing public education means that a special room with network terminals might be affordable at best, but not intensive and extensive use in the classroom. But we also know that once the digital network begins to be used, this use grows exponentially and has an enormous contagion effect; that this very use produces a degree of expertise which can be socialized among students, and between students and teachers; and that networked study does not do away with the encyclopaedia but makes it accessible, approachable and adaptable to users' tastes.

By the same token, there is no clear ending to this process, which should bring the logic of the network and mass pedagogy into play together. There is fear and enthusiasm, insecurity and curiosity, resistance and openness. It is a culture clash with practical consequences. Certainly, teaching based on memorization and the compartmentalized presentation of knowledge cannot survive the ease with which memory is objectivized and expanded in a computer, or the swiftness with which heterogeneous data and disciplines are linked together in networked projects.

Among the issues raised by this are the tensions that are bound to arise between students who become skilled in network use and teachers who feel they are

losing authority in this process.¹⁷ Another issue is segmentation of access, since there remain differences in the type of software installed, the accessories available, the intensity of Internet access and the training received by teachers. Furthermore, while in some schools computer use is confined to mechanical application exercises, in others its potential for learning, experimentation, project construction and teamwork is optimized; and while some use the Internet for games, others use it to learn (Trahtemberg, 2000, p. 10).

Daily use of information and communication technologies creates problems whose extent and solutions are not yet known, but which have to do with the values, attitudes and expectations of children and young people who spend a large part of their time in front of screens and monitors. New addictions to games and trivial information, low tolerance to frustration, unwillingness to defer gratification, difficulty in rationalizing effort, distaste for written forms of learning and for extended in-depth research into a single subject, delegitimization of the authority of teachers and other adult figures, an excessively utilitarian attitude to knowledge, unwillingness to communicate face to face and a diminished capacity for spoken expression may be some of the problems that need to be considered. Warning voices are not lacking: "An already weak capacity for reading comprehension will become weaker and weaker, not only because students will read fewer and fewer books, but because they will increase their reading of short, broken messages like those they encounter on the Internet and in chat or e-mail" (Trahtemberg, 2000, p. 14).

For this reason, it is "vital to emphasize values and the importance of attitudes once again, as well as the indispensable acquisition of abilities, skills and knowledge that help individuals develop their own talents to the utmost and then apply them to the positive development of social institutions" (Almada, 2000,

p. 16). Research by FLACSO in a number of Latin American countries suggests that one of the problems as regards the social impact of the Internet on school culture is the tendency for it to be implemented in a merely instrumental or technical way that fails to capitalize on its potential as a language and system of representations in which young people create and recreate narratives and views of themselves and society (Bonilla, 2001). Again, a study among school students in Bogota showed that Internet use in schools tended to amount to no more than an electronic substitute for the time-honoured encyclopaedic approach, reproducing traditional pedagogies (*ibid.*). Methods need to be devised to follow up and evaluate the use of information and communication technologies in the school learning process, so that both students and teachers not only learn how to use these technologies, but also develop criteria that enable them to learn better, develop a critical spirit and combine recreational and educational aspects as a result.¹⁸

Other criticisms of the way computer provision programmes are applied in the education system relate to the role and training of teachers. Among other things, it is pointed out that when training is carried out, programmes do not specify the profile of the teacher to be trained and information and communication technologies are not incorporated into training curricula (Martínez Santiago, 2000). It is also pointed out that teaching a networked course is very different from teaching a traditional one, since teachers have to encourage the interaction of participants. This "requires teachers to spend the day answering questions, monitoring discussions, providing feedback", which means "getting into contact several times a day, reading their students' notes and answering them, quite apart from correcting homework and checking individual or group work, which also needs dedication" (Trahtemberg, 2000, p. 6). Thus, teachers have to be simultaneously learning new methods and content and acting as pedagogic reformers and facilitators, all this in relation to a new tool that their students are probably learning to use faster than they are.

¹⁷ Research by the Latin American Faculty of Social Sciences (FLACSO) using case studies conducted in different Latin American countries found that "the informal exchanges that arise among students during practical computing sessions neutralize and diminish the teacher's ability to exercise control", and that "the virtual classroom is a place where the playfulness of students clashes with the vertical authority of the teacher (...) the Internet marks the boundary between experience inside and outside the classroom, inside and outside the educational order (...) between the culture of books, understood as a way of relating, of exerting pedagogic control over the student, and new forms of learning involving journeys through cyberspace by young people..." (Bonilla, 2001, pp. 9-10).

¹⁸ It is not easy to evaluate the impact and achievements of educational computing programmes, however, since equipment and information programmes and the prior capabilities of teachers in their use vary from one establishment to another, and because it is difficult to separate out the effects of information and communication technology use in schools where all sorts of different activities are taking place (Jara Schnettler and Pávez, 2001).

Classroom use of conventional audio-visual resources such as radio, video and television should also become more and more widespread in schools, and this once again places teachers in an unaccustomed position. Experience shows that students' attention, motivation and absorption can increase considerably when audio-visual material is introduced and then used as the basis for work with a more horizontal and conversational structure. By introducing these media and encouraging critical discussion of them, schools can overcome the opposition between school learning and media consumption, stimulating students to be more selective and critical in their cultural consumption. The challenge for schools, particularly in the public sector, is to relinquish their defensive attitude towards mass communications and take advantage of the plasticity of these media to transmit and combine knowledge, while at the same time organizing this mosaic of media stimuli in such a way that knowledge is not trivialized and students are encouraged to be selective.

The use of information and communication technologies in schools opens up different theoretical perspectives which in turn raise questions to which there are no easy answers (Jara Schnettler and Pávez, 2001). Are these technologies just supporting instruments for the learning process or the engine of pedagogic and organizational change, or both at once? Who are the best agents to bring about change through the use of these technologies in schools, and what technological capabilities need to be promoted there to empower and be empowered by information and communication technologies? What is the reason for promoting the use of these technologies in schools: results, motivations, processes, capabilities? What is certain is that their use has an immanent meaning related to the learning process itself and the motivations involved in this process: a purpose within the school that has to do with changes in teaching practices, and a clear objective beyond the

school, which is to educate people to operate in the knowledge society.

Concerning learning processes in schools, it is argued that information and communication technologies make it easier to understand key concepts in the sciences, language and mathematics and enable students to absorb the logic of these disciplines through the use of methods that allow more profound and immediate assimilation (interactivity, simulation, play, modelling). Consequently, training in these technologies is an end in itself, as they are an indispensable minimum in the working and cultural world of today and because they enable more significant learning of knowledge as a whole. As has been noted, however, the spread of these technologies in schools is hindered by the complexity and heterogeneity of education systems, large differences in computer resources, institutional plans, teacher training, the priority given to them and the number of hours of use in the school day, among other aspects.

Lastly, providing schools with audio-visual and computer equipment is the beginning of a process and not the core of educational transformation. Educating people for the information and knowledge society means much more than swapping books for screens or monitors. It means combining the best of the critical tradition and pedagogic experience with the new technological options and coordinating formal education with daily long-distance communication practices in a society where these practices are becoming more and more important, massive and intertwined. The road is a long one and it will test planners, school heads, teachers, students, students' families, software writers and culture industry communicators and strategists. From society it will demand a broad consensus that outlasts terms of government, both to ensure continuity and ever-increasing achievement and to provide the resources needed for a leap forward in education and knowledge that matches up to the challenges dealt with here.

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